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A SEMIOTIC ANALYSIS OF THE RESEARCH PARADIGMS
BEHIND THE APE LANGUAGE EXPERIMENTS

Master Thesis

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I have written the Master Thesis myself, independently. All of the other authors' texts, main viewpoints and data from other resources have been referred to.

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INTRODUCTION

This work aims to investigate how different research paradigms have led to opposite results in the interpretation of the *Interspecific Communication Experiments* (ICE)¹, as well as to establish how these contrasting ideas have influenced the methodological approaches used by the researchers in their attempt to teach human language to apes. Specifically, the present paper will focus on the experiments involving bonobos (*Pan paniscus*). Bonobos represent one of the lesser known species of great apes. This species is only found in the Congo area and their classification is fairly recent; they are, with chimpanzees (*Pan troglodytes*), our closest relatives, sharing with us 98.8% of some DNA sequences (Furuichi and Thompson 2008: 1). The choice is not casual: bonobos linguistic capacities seem to exceed those of other apes. But, more importantly, they have been studied by Sue Savage-Rumbaugh, whose methodological approach to language teaching is based on a full immersion technique rather than based on an active training.

Particular attention will be devoted to the experiments concerning sign-language acquisition and speech understanding of above mentioned species, but several examples from experiments involving other species of apes will be provided to support our argumentations. This work means to explore the nature of the *Interspecific Communication Experiments* with the intent of demonstrating how these experiments are characterised by a general tendency to disregard apes creative use of language; our claim is that researchers are more interested in a mere passive reproduction of signs and syntactic combinations rather than in the way apes creatively use language; moreover, we aim to prove that the immersion of apes in a fully linguistic environment, apes' use

¹ We will use this expression to refer to those sets of experiments that aimed to teach human language to apes. Other animal species have also been under study, but our focus will be put on the apes' example.

of language and extensive use of linguistic tools has shaped the semiotic reality of the animals under experiment and has promoted the emergence of certain cultural practices in apes.

Our claim is that the fierce debate and controversy on the legitimacy of these experiments is caused by the different result expectations of researchers, as well as by the opposite ideas that they share on the nature of language and symbolic communication. This led to the creations of diverse methodologies conceived to teach human language to apes that are based on extremely rigid criteria that do not take into account the active capacities of apes as creative subjects.

Structure of the Thesis

The first section of this work will serve as a theoretical basis upon which to build the further development of the thesis. This section will mostly provide a historical perspective to the issue in analysis, since this part of the work will provide the theoretical background necessary to contextualize the following chapters. For this purpose, a definition of symbol, from a semiotic point of view, will be provided to the readers and we will highlight how different visions coexist on the subject. Special place will be given to the idea of language as symbolic communication *par excellence*, besides this section will illustrate how language has been given a special place as a qualitatively different tool of communication and of thought making. Finally, the first chapter will include different definitions of communication and will briefly introduce the way animal communication has been traditionally approached and it will include the general ideas that researchers have on the *Interspecific Communication Experiments*.

The second section of this work will be devoted to the treatment of bonobos' species-specific communication systems. This chapter will also present a brief history of the ICE, starting from the earliest attempts in the 18th century to the more recent work by Sue Savage-Rumbaugh. Here we will introduce Kanzi, a male bonobo under study at the Language Research Center (LRC) in Georgia and we will discuss the way he has acquired and employs natural language. Finally, this chapter will include a general

overview of the different ideas on language: for this purpose, we will discuss the traditional definition of language and the more recent pragmatic view of sociolinguistics.

Finally, the last part of this work will be dedicated to the analysis of Sue Savage-Rumbaugh's methodology (1985, 1995, 2001, 2009), which will be examined in contrast with that of Herbert Terrace (1979). The two have been chosen because they are representative of two opposite directions in language teaching to apes: the first oriented towards the social dimension of language acquisition, while the latter more focused on the grammatical and syntactical features of language. The central section of this chapter will be utilized for discussing apes' creative use of language and we will show how language modelling capacities have contributed to shape the semiotic reality of apes.

Object of Analysis

The present work aims to examine the methodological approach that researchers used in the apes' language experiments. We will provide a semiotic interpretation of the researchers' result expectations and research paradigms, striving to reconstruct the ideas behind the researchers' methodological approach to language teaching. Different ideas on the nature of language gave rise to different strategies conceived to teach human language to apes; our interest is directed to the way these different approaches influence the results and their interpretations, but we will also pay particular attention to apes' creative use of language. We will try to demonstrate how the general theoretical framework of the ICE limits the possibility for apes to use language as their own tool of expression. We believe that variations of sign production tend to be disregarded and, generally, discouraged, because the ideas behind the ICE do not integrate apes' own semiotic reality into their research scope. We will also deal with the way language modelling capacities influence the species-specific semiotic reality of apes.

This work will not specifically deal with the evolutionary reasons behind human language development nor will it address the mental cognitive capacities of apes in

relation to those of humans, because we believe that these aspects have been already widely looked at by previous research. Furthermore, this work will not discuss the ethical implications of the *Interspecific Communication Experiments*. On the other hand, anatomical differences between humans and apes will be highlighted to support our argumentations and they will be used to endorse our claims, specifically that apes' own semiotic world and morphological differences have been ignored in pursuit of teaching human language to apes.

Historiography

In this paragraph we will provide a brief review of the most relevant contributions to this issue, trying to highlight as much as possible the different visions of scholars on the ICE.

The earliest attempts to teach language to apes can already be traced back to the 18th century, when Scottish Lord Monboddo theorized the possibility to teach language to orangutans. Well-documented and more practical cases can already be found in the earliest decades of the 20th century. In the 50's Keith and Catherine Hayes (1951) attempted to teach spoken language to a chimpanzee named Viki, but failed miserably since at Viki's death she was unable to utter any real words. In 1966 Beatrix and R. Allan Gardner became famous for having trained a female chimpanzee named Washoe to use sign language. Their attempts were soon replicated by others, for example Francine Patterson in 1972 started training a female gorilla named Koko and Terrace Herbert worked in the 70's with a chimpanzee he had named Nim Chimpsky. Methodological changes were made by David Premack: moving away from sign language teaching, he had trained a chimpanzee named Sarah to use plastic tokens as linguistic symbols. Similarly, Duane Rumbaugh taught Lana, another chimpanzee, to use a digital keyboard connected to a computer. This methodology was later adopted by Sue Savage-Rumbaugh, who firstly attempted to teach two chimpanzees named Sherman and Austin and later on instead focused on bonobos (Matata and Kanzi).

Ape language acquisition is a rather controversial topic. Many researchers have disputed the results of the experiments, claiming that they were influenced by over-interpretation and by the too strong bond linking the researcher and the subject-ape (Sebeok 1980). Although many apes have shown a great capacity in some kind of sign language (American Sign Language or ASL and lexigrams are some examples), many scholars, with Sebeok in front-line, have questioned the symbolic nature of such acquisition. They claimed that these apes were actually relying on indexical connections: they did not really understand what they were saying or they were asked, but they were associating an input to an output.

In 1981 Sebeok organized a conference on the so-called Clever Hans phenomena² at the New York academy of Sciences calling for an end to all further research in the field of animal language. According to Sebeok, all these experiments were the result of misinterpretation of the animals' responses to unconscious cues coming from the researchers themselves. In this sense, apes' linguistic abilities could be simply explained as a fallacious interpretation of the experiments' results.

"Kanzi's Primal Language: The Cultural Initiation of Primates into Language" published by Pär Segerdahl, William Fields and Sue Savage-Rumbaugh in 2009 represents one of the most interesting and insightful works dealing with Kanzi's language acquisition and language use. The book discusses the nature of Kanzi's language acquisition, trying to stress the relevance of apes' language experiments for further scientific discussion. The authors also describe the methodological approach used by Sue Savage-Rumbaugh as well as her ideas on the nature of language and try to address some concerns regarding the nature of the experiments, with particular reference to the criticism directed to the artificial settings of the experimental area.

More recent critical analysis of the apes' language experiments comes from Dario Martinelli (2010) who noticed a series of generalizations and unjust accusations

² Clever Hans was a horse that in the early 20th century became extremely famous because he was reportedly able to understand human speech. He was said, among other things, to be able to count, tell the day of the week and perform complex mathematical calculations. It was later discovered that Clever Hans was only relying on the unconscious cues given by his trainer, Wilhelm von Osten. He was able to answer as long as his master was present and knew the correct answer.

that tend to characterize the apes' language experiments discourse. In his work, the author highlights how these experiments have been generally treated as an organic whole, meaning that authors tend to generalize the results produced by one experiment to another. This implies that scholars usually disregard the fact that these experiments consist of very diverse methodological approaches, but they also ignore the fact that different ape species have been subjected to heterogeneous studies. Martinelli is one of the few to notice how apes' language research criticism is instigated by a common tendency to gather different experiments and animal species in the same group, neglecting the fundamental diversification of the animals' semiotic realities.

Methodological Considerations

We will consider various sources in the writing of the present paper, which will give the final work an inter-disciplinary outlook. For this purpose, we collect data from Sue Savage-Rumbaugh publications in regard of Kanzi's exposure to language. The author's work will also be a precious source of data concerning captive bonobos.

Our argumentations will be supported by ethological material that will serve as a basis upon which we will construct further discussion in terms of methodology employed by the researchers aiming to teach language to apes. Ethological material will provide information about wild bonobos' vocal and non-vocal communication, and will shed light on the social organization of bonobos in nature. Linguistic and sociolinguistic works will be considered in order to draw parallels between different definitions of language. This will provide the necessary data for a comparative analysis of different research paradigms employed by the researchers. Semiotics will serve as a tool to disclose the general tendency of researcher to disregard apes' agency and semiotic capacities. We argue that apes have been traditionally used as an object of research and not as active subjects capable of making their own choices based on personal preferences, mental states, feelings as creative subjects.

1. SYMBOLIC COMMUNICATION AND LANGUAGE

The present section will define symbolic communication in animals and it will endeavour to present the way animal communication has been approached in previous studies. For this purpose, a definition of symbol will be provided to the readers so to facilitate their understanding of the theoretical background used in the present analysis, but also to contextualise the central issue of the thesis. We will also deal with the definition of communication and particular attention will be put on the status of human language in the academic discourse. Language is still considered a clear dividing line between the human world and that of other animals. We notice a general tendency to consider language as the symbolic communication *par excellence*. This creates situations in which animals' and humans' communication systems are approached in very different ways. Furthermore, in previous studies, a general tendency to approach animals as mere objects of research has been outlined, a clear example is that of Terrace Herbert. This is very evident if we look at the terminology used by these scholars, as well as their expectations for the outcomes. In this sense, we argue that many of the previous studies have lacked consideration for the animals' active capacities as thinking subjects and participants, and have instead looked at animals as mere passive objects of research.

In this chapter we will try to show how these ideas influence the methodological approach of researchers who attempted to teach human language to apes.

1.1. Defining Symbols from a Semiotic Perspective

In order to provide a general theoretical background to the following chapters, this paragraph will deal with the definition of symbol. For this purpose, we will go back to the way Charles S. Peirce defines symbol and how this concept has been employed by different authors with a personal interpretation. We note a general tendency to assign symbolic value only to human language as well as an inclination to use the concept of symbol with a far narrower perspective than what Peirce theorized. With this in mind, we aim at providing a deeper understanding of what symbolic communication consists of, which will also cast a light on the reason why researchers take different stands on the experiments concerning teaching language to apes.

Peirce defines symbols as conventional signs. This means that the relation between signifier and signified is arbitrary because it is impossible to trace any “natural” connection between the two. This also implies that the interpreter needs to recognize and reconstruct such connection. In the case of symbols, therefore, the sign has an arbitrary connection with its referent.

The word symbol has so many meanings that it would be an injury to the language to add a new one. I do not think that the signification that I attach to it, that of a conventional sign, or one depending upon habit (acquired or inborn), is so much a new meaning as a return to the original meaning (CP 2.297).

What Peirce stresses is the conventional nature of symbols, which essentially means that their meanings are established through a sort of non-written agreement between the users. According to Daniel Chandler (2010: 36) a symbol is a mode of a sign in which the signifier does not resemble the signified, but the relation between the two is established, agreed upon and learned. Like many others, Chandler offers as an example natural languages, but also “traffic lights” and “national flags”. Stressing Peirce's influence, Chandler argues that symbols are highly conventional. Moreover, he states that according to the American philosopher a symbol is “a sign which refers to the object that it denotes by virtue of a law, usually an association of general ideas, which operates to cause the symbol to be interpreted as referring to that object” (CP 2.249). Without any connection to its object the symbol would cease to exist, and this

connection is done solely in the symbol-using mind. A symbol is a sign “whose special significance or fitness to represent just what it does represent lies in nothing but the very fact of there being a habit, disposition, or other effective general rule that it will be so interpreted” (CP 4.447). This also implies that, since symbols are based on conventionality, their relations to their object appears less natural than that connecting indices and icons to their respective objects. Marcel Danesi also stresses that “a symbol stands for its referent in a conventional way. Words in general are symbols. But any signifier—an object, a sound, a figure, etc.—can be symbolic” (2004: 31). Moreover, he also claims that “Iconic, indexical, and symbolic modes of representation often converge in the creation of a sign or text” (ibid. 32), therefore suggesting that a pure iconic, indexical or symbolic sign is hardly possible to find. Indeed, a sign, in the Peircean sense, comprises three facets; this means that we deal with signs that present simultaneously (at least partially) iconic, indexical and symbolic components at. Peirce stated that although “any material image” (such as a painting) may be perceived as looking like what it represents, it is “largely conventional in its mode of representation” (CP 2.92).

We say that the portrait of a person we have not seen is convincing. So far as, on the ground merely of what I see in it, I am led to form an idea of the person it represents, it is an icon. But, in fact, it is not a pure icon, because I am greatly influenced by knowing that it is an effect, through the artist, caused by the original's appearance... Besides, I know that portraits have but the slightest resemblance to their originals, except in certain conventional respects, and after a conventional scale of values, etc. (ibid.).

According to Peirce pure icons vaguely signify possible objects which resemble them since they are not actually connected to any object; in the same way, “indices could never result from any combination of such vague, dream-like signs” (Schilhab, Stjernfelt, Deacon 2012: 42). And, finally, pure symbols without any iconic component or indexical reference become impossible because in order to be understood, a symbol must bear information in the shape of an icon and relate that information to an object by means of an index (ibid.). We argue that this postulates the idea that animals must use symbols, at least on an “elementary level”. From this perspective, the creation of a too sharp distinction between humans and animals is at best counter-productive, since

it does not take into account Peirce's ideas on the purity of signs on a concrete level, as shown above. We argue that since no pure icon, index and symbol can be encountered in everyday life, claiming that animal communication relies on iconic qualities and indexical connections makes little sense, since signs will always manifest themselves in their three facets aspect. This tacitly implies that there exist no sharp qualitative changes between types of semiosis.

1.1.1. Language as Symbolic Communication par excellence

Kenneth Burke in "Language as Symbolic action" (1966) claims that symbolic communication belongs only to humans, excluding any possibility for symbolicity in the communication systems of other animal species. As pointed out by Dario Martinelli symbols have been long considered the ultimate trait of distinction between humans and other animals (2010: 72). For many scholars, humans are virtually the only symbol users, to the extent that Terrance Deacon defines humans as "symbolic species" (1997). However, as claimed by Sebeok these ideas are based on the false assumption that symbols equate with natural languages (Sebeok 1990: 42). The Hungarian semiotician brings two examples of symbolic communication in animals: the honeybee and a species of dipterans belonging to the family *Empididae*. In the first case, he describes a precise communicative strategy employed by honeybees claiming that "the bee's tail-wagging dance conveys [...] the direction of the goal, the Sun being used as a reference point" (Sebeok 1990: 43). If the dance is performed on a vertical angle, this information is transferred through an indexical reference. However, since the hive is usually dark and the Sun is not visible from the inside, the bee tends to perform its dance on a horizontal surface, substituting the Sun angle with the gravitational one. This kind of substitution attenuates the indexical aspect of the sign, so that the symbolic one becomes the predominant feature of the sign. In the second case, instead, Sebeok talks of a particular ritual performed by an insect species belonging to the dipteras' family that is carried out after copulation so to avoid cannibalism: the male of the species presents the female with an empty balloon as an offering. This gesture has been described by Sebeok as a "wholly arbitrary symbol" (Sebeok 1990: 42), used for

the purpose of avoiding falling prey of the female. These are of course only few of the instances of animal symbolic communication, but they are useful to help debunk the deeply-rooted idea that symbolic communication belongs only to the human species. Kenneth Burke, like many other scholars, argues that symbolic communication is what separates humans from other animals. Burke essentially set up two different categories: humans and animals. Humans stand alone in the dense forest of symbols and are the only animals capable of communicating through the use of symbols. The problem is that Burke himself has never provided a clear definition of symbol. He claims that humans are *the only* symbol users, but it is unclear what a symbol is from his point of view. Stephen J. Lind claims that the difference between *signs* and *symbols*, from Burke's point of view, is that symbols are consciously constructed for the purpose of communication, but above all they are used to refer to other concepts in an abstract fashion (2013: 229). Taken from this side, animals seem to communicate only in an automatic motion because they do not employ symbols but only signs. This is clearly a personal vision that does not reflect Peirce's triple sign distinction between icons, indices and symbols. Burke continues by telling how he could not instruct a bird, trapped in his house, to leave the room through the window by simply pointing at it (1966: 3-4). This, for him, represented a clear example of lack of symbolic understanding. Burke's argumentation is clearly biased by his anthropocentric perspective. The author expects a wild bird to understand, without previous agreement, a symbol which is essentially human-constructed. Following Burke's logic, since dogs usually understand the pointing gesture while babies do not until they are 11 to 12 months of age (Tomasello, Carpenteret, Liszkowski 2007: 705), it could be argued that dogs are able to use symbols, while babies only communicate in an automatic and unconscious manner. Furthermore, Burke discarded the natural communication systems of birds in their environment, which also shows a great degree of symbolicity (Barbieri 2007: 145). In addition to this, Seyfarth and Dorothy Cheney (1992) suggest that certain pre-linguistic abilities are present in vervet monkeys. According to the authors, vervet monkeys are able to warn other members of their group with specific alarm calls, which differ according to the threat that is approaching (eagles, leopards and snakes). Each predator alarm call requires a different response by vervet monkeys, so

to escape dangerous situations. Seyfarth and Dorothy Cheney believed that this sort of alarm calls could be compared to names which the vervet monkeys have arbitrarily associated to different predators. However, these alarm calls have been generally disregarded as mere instinctive responses, used as an indexical reference. It is worth mentioning that young vervet monkeys use these alarm calls to scare off other members of the group so to steal food from stronger and bigger specimens (Stanford 2006: 94). In the same way, weaker and beta males give false alarms to scare alpha-males in order to mate with females. These are clear examples of intentional application of alarm calls that show an autonomous use by the vervet monkeys done for their own personal advantage.

1.1.2. The Evolution of Language and the Symbolic Species

Animal communication is usually measured and studied in relation to human linguistic abilities. As a consequence, animal communication has been always regarded as a kind of inferior and incomplete language. This vision is nourished by the fact that in nature we cannot find an equivalent/less-developed capacity in other animal species. Deacon claims that other animals are pre-maladapted to symbolic communication (1997: 50). The author believes that the capacity for iconic reference can be considered a basis upon which indexical relations are built and, in turn, indexical reference is seen as the basis used by human beings to think symbolically (1997: 79-92). What Deacons claims is that non-human animal communication makes use of iconic and indexical references, while human linguistic abilities are based upon abstract symbolic constructions. The author believes that the reason why humans have developed the capacity to use symbolic references is to be found not in our brain size to body size ratio as traditionally claimed, but in the fact that our cerebral cortex is characterised by a fair quantity of synaptic places which are free to be used for innovative associative tasks. Hoffmeyer (2008: 164-165) tells us that the growth of animal brain is usually associated with the overproduction of new cells and the elimination of non-functional cells. In the embryonic cells, future human brain cells manifest a rich division activity, especially in the cerebellum and pre-frontal cortex

region. Brain cells are usually specialised in long-distance communication, which is the reason why they can exert influences upon very distant cells. As mentioned, human brain appears to be oversized if compared to our body size. This implies that many tissues of our body have not been able to get an adequate number of connections to their respective brain centres. Hoffmeyer suggests that as a result “a network of causal and communicative relations is established via the pre-frontal cortex that reaches out to all areas of the brain and body” (Hoffmeyer 2008: 280). This network plays a major role in the construction of symbolic references and it seems to be one of the centres responsible of our linguistic abilities. But how exactly did language evolve from our hominids ancestors and why? Classically, scholars have claimed that the emergence of human language is connected to the expansion of our brain. Deacon, however, suggests an opposite theory. The American anthropologist believes that the emergence of language is connected to a later development of human brain: the growing complexity of symbolic communication is seen by the author as being mainly responsible for the development of the brain size. He affirms that our ancestors may have gradually learned to communicate via symbolic signs which only later became the main communication system of our species. In a way, this can be compared to what children experience in their first years of life: no human being is born with the complete ability to employ symbolic references, but this is developed and mastered in the first two years of life (Hoffmeyer 2008: 292). For Deacon, the reason why language came to existence is to be found in the need for social order and social institutions (1997: 350). What Deacon claims is that symbolic communication rose in the moment groups of hominids needed to create institutions like marriage. Indexical thinking was not considered a strong enough basis for supporting this kind of social institutions and social cooperation between the members, therefore the need for a more effective instrument lead to the evolution of symbolic thinking and communicative systems.

Even though Deacon’s suggestions are rather interesting and provide useful insights, our idea is that he fails to consider that the complexity of social institutions and social cooperation require a prior development of symbolic thinking. This could have been not achieved only with an indexical or iconic kind of cognition, since

such complex organizations are developed upon symbolic references. The problem seems to rise especially because Deacon employs Peirce's terminology in a narrower sense, specifically he uses the term symbol only to refer to language. Symbolic thinking must have been a precondition for the creation of social institutions.

When approaching human and animal communication, Deacon and Burke stand as only some of the few authors who have used the notion of symbol with an evident personal interpretation. It seems rather clear that human language has been equated to symbolic communication in many instances; language has been interpreted as the distinguishing feature of humans, what separates us from other non-human animals. However, as shown in this section symbolic communication is not an only a human prerogative and, above all, symbolic thinking does not necessarily mean use of language. This is particularly clear if we go back to the definition of symbol provided at the beginning of the chapter as arbitrary and conventional sign.

The next paragraph will shed light on the way communication has been traditionally defined. This will serve as a basis upon which to construct later discussion of the material.

1.2. Different Approaches to Animal Communication

A definition of communication is needed in order to provide a solid theoretical background that would facilitate the understanding of the presented material. This is not an easy task, since very different definitions coexist in remarkably distant disciplinary fields. This effort is also complicated by the confusion around related concepts such as that of *information* which can be defined as a "feature of interaction" between sender and receiver (Hauser 1996: 6). We would like to start from the linguistic definition of communication, since we are going to deal with apes' language acquisition this definition seems to fit in our general framework:

Human communication [...] includes forms of verbal communication such as speech, written language and sign language. It comprises non-verbal modes that do not invoke language proper, but that nevertheless constitute extremely important aspects of how we communicate. As we interact, we make various gestures – some vocal and audible, others non-vocal like patterns of eye contact and movements of the face and the body. Whether intentional or not, these behaviours carry a great deal of communicative significance (Lindblom 1990: 220).

Naturally linguistics deals primarily with human communication. Reading in between the lines it is possible to understand that language is considered the primary instrument of communication, since “non-verbal modes” are here described as “important aspects of how we communicate” but only secondary to language proper, that is natural languages. From this point of view, it is clear that language stands once again as the best instrument of communication, without any equivalent counterpart in nature and little interest is given to other forms of communication.

While ethology stresses the importance of behavioural responses of the receiver to the sender’s signals (Hailman 1977: 52), cognitive psychology highlights that:

Communication is a matter of causal influence... the communicator [must] construct an internal representation of the external world, and then... carry out some symbolic behaviour that conveys the content of that representation. The recipient must first perceive the symbolic behaviour, i.e. construct its internal representation, and then from it construct a further internal representation of the state that it signifies. The information being transmitted in this view is only indirectly ‘about’ the world. The ‘primary purpose’ seems to be the transfer of mental states (Johnson-Laird 1990: 2-4).

In a more general way communication is defined as:

the transmission of messages through some channel and in some medium. Communication theory usually classifies communication in *modes*, that is, different ways of exchanging messages: for example, *gestural* (hand-based communication); *visual* (picture-based communication); and so on (Danesi 2009: 69).

Communication is therefore described as the exchange of messages or more simply as the exchange of information (Danesi 2004: 276).

When researching animal communication many scholars have failed to take into account important factors and a prevailing generalization affects much of the studies concerning this topic. This is particularly true in case of the *Interspecific Communication Experiments* (ICE). Although usually the animals being studied were apes, also other animal species have undergone several experiments of this kind: one famous example is that of the grey parrot Alex. Scholars, however, fail to realize that they are dealing with different species each with their own strength and natural tendencies and tend to treat all these tests as all belonging to the same group, even though they often deal with different animal species, employ different methodologies and have very different aims.

Adrian M. Wenner claims that the main problem is that many researchers have limited their scope of analysis to a very narrow number of species, attempting to discuss animal communication in general terms (1969: 231). We argue that this is exactly what happened with the research focused on apes' language acquisition. Many have accused the experiments of being biased by the sole desire of the researcher to prove apes' ability to learn human language, with a complete disinterest for scientific studies. Others have claimed that the results were produced by simple Clever Hans phenomena (Sebeok 1980: 28).

It is interesting to note that, generally, learning capacities of animals have been disregarded (Wenner 1964: 234), while more focus has been put on the genetic factors that contribute to the communicative act. This is completely unjustified, because past experience represents a vital aspect for understanding animal communication. And finally, it is essential to determine the particular way an animal communicates: for example, the usage of simpler units that can be then combined in more complex signs can evoke different responses than those of simpler units. All these factors are crucial for a scientific approach to animal communication. Such approach, however, being extremely restrictive and highly theoretical creates several problems in its actualization. It seems to us that learning abilities and the experience of apes have generally been underrated and completely dismissed as superfluous, in the light of the genetic predisposition that humans are claimed to possess and that

are considered as responsible for the development of language. In our opinion, Wenner's argumentations remain current to present-day situations, especially when studying the ape language experiments.

1.2.1. The Interspecific Communication Experiments

The interaction between humans and other animal species has been a topic of interest for centuries. Since humans have started to build cities, organizing themselves in highly complex institutions, they have always questioned their place on Earth and wondered if other living organisms were so different from them. Our position on the planet is a double-edged sword. On one hand for many centuries philosophers have praised the absolute uniqueness of human abilities (especially linguistic ones), on the other hand this was very often accompanied by a feeling of loneliness and desire to better understand our relationship with other living organisms that were sharing a common planet with us. Language itself continues to be perceived as a human exclusive capacity, with no other equivalent amongst other animals. It is through language that we emerge from the animal realm and it is through language that we are able to break the chains of our biological *Umwelt*³.

Thomas A. Sebeok recognised human language as the fundamental aspect of this diversification. According to the Hungarian semiotician, humans are not prisoners of their soap bubble as other animals are. The human *Umwelt* is not only biologically based: thanks to our capacity of self-analysis and our linguistic abilities, we are capable of modelling our own reality, we are able to construct complex relations between signs and consciously create our own world. Moreover, according to Floyd Merrel (2001: 244):

³ The *Umwelt* can be defined as “the world around an animal, conceived by it as a perceiving and operating subject, i.e., the subjective world as contrasted with the environment.” (Uexküll 1994: 1146). The concept was introduced by the Baltic German biologist Jakob von Uexküll.

We humans, proud humans, have entered with mind and heart and soul into the illusory sphere of symbolic signs. I write 'illusory sphere', because symbols, signs capable of signifying objects, acts, and events in their absence, are excellent signs of deceit, subterfuge, and out and out lying.

The core quality of symbols lies in their ability to interrupt the normal stream of perception, thus creating a sort of break between the perceptual organs and effector organ ordinary activities. The problem with such claim is that they are strongly anthropocentric. This claim implies that the difference between humans and animals is of qualitative type, meaning that symbolic use is the definitive trait of diversification between humans and other animals. However, as shown in previous paragraphs, non-human animals are also capable of engaging in symbolic communication. It is important, in the first place, to define what exactly language is and how species-specific this tool is. Of course, traditional definitions of language belong to the linguistic sphere and they are obviously tailored to humans' specific communication system. This implies that many scholars assert that no other equivalent to human language can be found in the animal realm. Ultimately, most of the semioticians seem to agree that language is a species-specific tool which qualitatively separates human communication systems from non-human forms of communication (Martinelli 2010: 134).

Since language is still perceived as an exclusive human trait, several experiments in the 20th century have been carried on animals with the intention of teaching them human language (Martinelli 2010), which not only would have proved that apes share a mentality with humans, but those experiments would have also cast a light on the evolutionary conditions of language. These attempts led to several methodological problems, one of which is the tendency to anthropomorphize animals' intentions, progresses and mistakes. The *Interspecific Communication Experiments* have raised several debates amongst semioticians and other members of the academia. First of all, they put on discussion the same notion of language as species-specific human device, whose acquisition is the result of specific mental structure only present in the human brain; secondly, because language is perceived as a qualitative tool of communication, separated from other animal communication systems, these experiments appeared as a contradiction. All the IC experiments carried out in the 20th century have been often labelled as a failure, biased by a willing to demonstrate that animals, especially primates,

are able to learn sign system languages and communicate with humans using an arbitrary sign system. For example, the Georgian ethnomusicologist and evolutionary musicologist Joseph Jordania is one of those scholars that opposes the entire idea that apes can learn to communicate through language. The author claims that even though enculturated apes are able to use words and answer to basic questions, they are in fact incapable of asking questions themselves (Jordania 2006: 334). Since asking questions is for Jordania one of the primary characteristics of human language, Jordania suggests that apes, in fact, do not use language. However, it is worth mentioning that Jordania seems to ignore the fact that the Gardners, among others, reported in several cases that Washoe used to “[ask] questions about the world of objects and events around her” (R.A Gardner., Van Catfort, B.T Gardner 1992: 30). In a similar manner, Steven Pinker is one of the most passionate opponents to the ape language experiments. Pinker views language as an essentially human-instinct (Pinker 1994: 20-21) not so much different from more physiological needs. In his opinion, apes or other animals do not possess such instinct: for the author, no ape has ever learned to use linguistic expressions, but their performances were merely a show, a desperate attempt of their trainers to demonstrate their abilities (Pinker 1994: 336-337).

Critical standpoints are quite strong in Sebeok’s works and that of his followers. Thomas Sebeok and his wife Jean Sebeok represent some of the most forceful critics of the ICE. In a collection of essays entitled “Speaking of Apes” (1980) the authors describe the vast amount of IC experiments available, providing their vision and critique concerning the actual scientific approaches and results of these tests. The entire collection represents a very well-structured and resourceful archive, and it is very often used as the source from where critics draw when they intend to demonstrate the fallacious nature of ICE programmes. For example, Allen and Beatrice Gardner, who were training a female chimpanzee named Washoe, have been repeatedly criticized and taken as an example of non-academic methodologies. According to Sebeoks, their methodological approach has produced distorted results along with a general anthropomorphization of the animals under examination. What the Sebeoks criticize is the apparent presence of situations that may have facilitated the emission of signs, therefore the experiments’ results must be considered a failure. Hediger observed for

about thirty years the experiments of the major researchers involved in projects constructed to teach apes to use human language – i.e., Robert Allen and Beatrice Gardner, Francine Patterson. However, he claimed that the animal subjects were not actually “learning language” but they were learning how to detect and respond appropriately to facial expressions, postural, and other non-verbal signals that their trainers were communicating to them, unaware of doing so (Favareau 2010: 239). What he questioned was the very nature of learned sign usage by these primates: according to the author animals’ usage of learned signs was far from being similar to how humans employ language. Hediger claims that the sign-language learned by these apes could have been explained as a mere response to the expressions of the experimenter, nothing more than a training performance. Hediger, like Sebeok, believed that the animal’s use of sign language is solely based on indexical connections.

Washoe, like many other apes under study, showed several instances of spontaneous sign usage and creation (see chapter 3.2). The Sebeoks have interpreted such cases as clear symptoms of scientific fallacy, since in their opinion these signs were simply seen by the experimenters as cognitive appropriation of a new sign system, when in reality they were emitted rather randomly. Indeed, we would argue that it remains difficult to clearly understand if Washoe was randomly emitting signs or if she was actually showing cognitive appropriation by creating new signs. However, innovation is a necessary condition for the very concept of human language. In any attempt to teach human-made sign systems to another animal we need to take into account the necessity for the animal to master language. In our opinion, the creation of new signs can be seen as a symptom of the animals’ appropriation of the newly acquired sign system. Furthermore, apes’ sign creation shows certain constant traits that would discredit Sebeoks’ position. This will be a central issue of the third chapter.

1.3. Do Apes and Humans Share the Same *Umwelt*?

When approaching the ICE, the *Umwelt* question arises. It has been claimed over time that other animals’ *Umwelt* creates the impossibility for them to learn a sign system that belongs exclusively to human *Umwelt*, while, in turn, we are able in

principle to access other *Umwelten* thanks to language. Nevertheless, as pointed out by Thomas Nagel (1974: 435-450), we cannot fully understand other animals' *Umwelt* outside our own human conception. In particular, talking about bats, Nagel identifies this impossibility in the divergence between their "range of activity and sensory apparatus" and ours. The author suggests that "our own experience provides the basic material for our own imagination, whose range is therefore limited" (ibid. 439). We can imagine and try to understand their world, but we are trapped by our own human limits. This poses several problems when approaching apes' language teaching, because we notice a general tendency to ignore the unique characteristics of the apes' *Umwelt*, because scholars tried to teach language to apes expecting that they would use such instrument in the exact same way humans do. This will be a central issue of the third chapter, however it is worth mentioning now that the genetic affinity of apes and humans has played a major role in the construction of the methodologies conceived for apes' instruction. It is no surprise that many authors have claimed that apes' and human *Umwelten* are very similar (Jerison 1982: 756). From this point of view, apes' and humans' *Umwelten* separate us from other primates. However similar, humans' and apes' *Umwelten* remain separate entities, each with its own unique features and traits. Similarities do not mean sameness. Apes' *Umwelten* need to be considered as separate and with their own characteristics, which still remain species-specific. Simplifications of this kind imply a lack of consideration for each species-specificity.

A different *Umwelt* poses other problems in regard to the interpretation of the results and of the practical way that language should be taught to apes. One clear example is that of Washoe who started signing *flower* any time a strong odour was present in the room (Martinelli 2010: 160), for example when a chicken was being cooked on the stove or when she smelled tobacco; similarly, she drew a series of circles when asked to draw a ball (ibid.) instead of drawing a circle as we would usually expect. While in the first case we assist to an over-extension of meaning prescribed by the fact that apes rely more extensively on olfactory traces than we do, the second example suggests that apes focus their attention more on the kinetic

properties of objects: instead of drawing the ball as a static object, Washoe drew the ball in movement, which was probably the way she saw balls more often.

In this respect, the *Umwelt* theory could provide a better understanding of the language acquisition and usage by apes, but it could also prove to be a valuable tool to construct a more suitable methodological approach that would take into consideration the way that apes interact with the surrounding world. We support the idea that this kind of methodology would be more attentive to the unique semiotic reality of apes. The third chapter of this work will deal more specifically with other suggestions of this kind.

2. APES' LANGUAGE ACQUISITION AND LANGUAGE USE

This chapter will deal with symbolic communication as present in the natural communication system of the *Pan paniscus*. This section will focus on Bonobos' natural communication systems such as vocalizations and gestural communication; Kanzi's case will be also introduced to the reader, with particular reference to the methodological approach used by his trainer Sue Savage-Rumbaugh and the language acquisition and language use of the subject.

Studies concerning language acquisition capacities of apes have occupied a prominent position in the academia and have been a lively source of discussion and counter posed opinions between different scholars. The earliest experiments concerning apes' language acquisition were attempting to instruct apes to produce spoken words. These experiments were based on the idea that to early and complete exposure of apes to human language would naturally follow production of speech. Since speech remains the most prominent expression of language, it is only natural that teaching language equals teaching speech. Experiments of this kind were already done in the 18th century, when a heated debate about the human status of orangutans lead an eccentric Scottish judge, James Burnett also known as Lord Monboddo, to design experiments aimed at teaching spoken language to apes (Blancke 2014: 40). More recent experiments include the Keith and Cathy Hayes effort in 1950's to teach a chimpanzee named Viki to produce spoken words (Lieberman 1998: 33). Viki was raised as a human child in a completely human environment. However, these trails only lead to unsuccessful results. This led the Hayeses to carry out intensive experiments on Viki consisting in exercises to manipulate her lower jaw with the aim of making it more similar to that of humans'. These attempts ended at Viki's death, when she was

only seven. However, even under such intensive training she only was able to “produce” four words, which remained not very articulate even after extensive training.

2.0.1. Difference in Vocal Tract Anatomy between Human and Non-Human Primates

The reason behind the negative results of experiments described above is to be found at a very anatomic level: apes lack some of the necessary prerequisites for articulate sound production typical of humans’ spoken words; to be more specific, the organs within their vocal tract (larynx muscles and vocal cords) cannot be moved as freely and as fast as humans’ organs can. When talking, humans produce sounds by moving the vocal cords in the larynx inward and outward, interrupting the normal flow of air through the larynx (Lieberman 1998: 46). The larynx’s muscles can be adjusted to produce a wide range of sounds by changing the rate at which our vocal cords move. Above the larynx, a tube called *supralaryngeal vocal tract* (SVT) filters the sounds produced by the larynx (ibid. 47). This means that the SVT changes constantly shape as we talk, allowing the production of time-varying formant-frequency patterns. The SVT has two main passages: one between the tongue and the back and roof of the mouth, the other through the nose, which can be opened or closed depending on the situation. This is exactly what allows the production of all the different sounds that characterise human language.

According to Philip Lieberman, humans are the only animal capable of producing all the sounds of human speech, since other animals’ SVT are not constructed in a similar way. First of all, while human tongue is quite thick and half of it is positioned in the throat other animals have very thin tongues situated almost entirely in their mouth; humans, moreover, have a very narrow opening of the larynx at the base of the tongue (Lieberman 1998: 48). What is interesting is that all these characteristics only appear in the later development of children (Lieberman 2007: 45) and are absent in other non-human primates also in their adulthood. The vocal tract of

Apes and young children is very similar and so are the shapes of their heads (Lieberman 1998: 51).

All these traits together allow humans to produce different ranges of sounds that other animals are simply unable to generate due to pure anatomical differences. Fossil records, moreover, suggest that the evolution of language has not been as sudden as many were lead to believe. The anatomical differences between humans and other animals did not appear unexpectedly. Indeed, fossils suggest a gradual mosaic evolution (Lieberman 1998: 333), meaning that all the prerequisites for language production and understanding (cognitive faculties, auditory channel, vocal tract) did not evolve simultaneously but in pieces and over time (ibid. 325). This would reinforce the idea that apes may share some basic cognitive capacities to use language, or, at least, it brings other non-human primates closer to us, more than what scholars tend to claim.

2.0.2. Apes' Use of Sign Language and Non-verbal Symbols

Since the experiments focused on vocal speech production showed unsuccessful results, many scholars took for granted that language was a human prerogative, the final hallmark between humans and other animals. Later experiments, however, showed that these conclusions were at best rushed. As discussed, the anatomical differences between apes and humans are too marked to allow apes to speak. Moreover, human language is much more than simple sound production. Bearing in mind the failure of those experiments aiming at teaching spoken speech to apes, later experiments focused closely on apes' acquisition of non-verbal symbols, such as sign-language and lexigrams. Initial reports came from Allan and Beatrice Gardner who had trained a female chimpanzee named Washoe to human sign language (Gardner 1969), followed by many other examples such as that of Sarah who had been trained by Premack and another chimpanzee named Lana that was using plastic pieces on a computer keyboard so to produce multi-word sentences (Savage-Rumbaugh, Rumbaugh, Fields 2009: 25). Other famous cases are that of Koko, a female gorilla trained in sign language, who had been studied by Francine Patterson

and Chantek, an orangutan trained by Lyn Miles and Ann Southcombe to use English Sign Language (Miles 1993). These experiments showed far better results and brought back the hopes of many researchers that desired to finally prove that apes were able to master human-made communication systems. However, as soon as this new wave of hope rose, interest focused on the animals' capacities to construct complex sentence structures and, therefore, on the syntactic abilities of apes. Since, traditionally, language has been equated to the correct use of syntactic structures, it was assumed that because apes were not able to construct complex and syntactically correct sentences (Terrace, Petitto, Sanders, Bever 1979: 893), they could not use language. This has been the predominant position in linguistics for many decades. Only more recently the idea that syntactic structures do not constitute the essence of human language has been brought forward. Sue Savage-Rumbaugh, for example, claims that teaching sign language to apes is methodologically incorrect since the structure of apes' hands is very different from that of humans': because apes walk on their knuckles, they have a much more limited mobility in their hands than humans, therefore their gesturing is highly limited by their own anatomical structure (Brakke, Savage-Rumbaugh 1995: 121).

2.1. Different Approaches to the Definition of Human Language

Traditional views on language try to define a system that functions syntactically, sometimes without real reference to external reality and, more precisely, without taking into account human life. In later years we witnessed a profound change in what defines language. More recent works reject these traditional visions and recognize the fundamental role of human interaction (Cowley 2011: 1). From this perspective, cognition is not anymore only embodied in the brain. While the internal dimension still plays an important role, events and change happen as people interact with each other and with the environment. It follows that language is not seen as a static reality, but becomes essentially dynamic. Cowley calls this a distributed perspective (Cowley 2011: 2). He moves away from the conventional perspective on language as a "synchronic system" and defines language as "[a] mode of organization

that functions by linking people with each other, external resources and cultural traditions” (Cowley 2011: 1). These ideas reject the traditional view of language as something that can be localized in interrelated levels of formal linguistic organization (Thibault 2011: 1) and sees it as an extremely heterogeneous phenomenon that involves highly complex interactions on different scales distributed through time and space. It follows that this new approach to language is not focused on the formal aspects of language that were previously so central, but emphasizes the dialogic nature of language. Ultimately, language is not localized in the brain of the speaker but it is embodied and embedded in social reality, meaning that it is not localized in it, but it shapes and contributes to shape social systems in culture. What is interesting about these ideas is that more formal aspects of language are not rejected *a priori*, but they are still recognized as important factors. The authors, however, stress the importance of language’s social dynamics which helps to shape the language systems as abstraction from *language* (Cowley 2011: 11), a term used to specifically refer to the face-to-face interactions which draw on multi-modal activities. As mentioned above, a more traditional approach sees children’s language acquisition as the understanding of how grammar rules used by adults work, with a consequent appropriate use of syntactic structures of their own mother tongue. From this prospective, learning language means essentially to learn syntax (Bruner 1983: 18). However, correct syntactic structures are by no reason always meaningful. As we know, it is possible to construct sentences with an impeccable grammar, that instead lack of any meaning. It is fundamental for the user to learn how to refer and how to construct meaning, so that the previously created sentence would also mean something; furthermore, it is necessary that with it the speaker could achieve the desired results. Finally, it is important for the user to learn how to achieve something through the use of words and, by doing so, he also learns how to successfully communicate ideas, needs and feelings. These three functions of communication are also referred to as syntax, semantics, and pragmatics (Morris 1938: 6-7) and they constitute the basis on which scholars have long debated whether it is possible to talk about language in a proper sense. We need to keep in mind that the subjects’ exchange of ideas and expectations are of vital importance and that mere correct grammatical use does not necessary mean

language mastering. Knowing how to correctly place words in a sentence, but being unable to achieve the desired results, is utterly useless.

Although many seem to find it necessary to compare apes' language use to that of young children (Terrace et al. 1979: 894), it is interesting to note that apes' and human children's language acquisition follow very different paths. We hardly ever teach language to children in a conscious way, at least at their earliest age. We try to teach them words, simple sentences and basic grammar structures, but most of the work is done autonomously by the child itself through careful listening and selection. It is here that the first difference between apes' and child's language acquisition arises. Apes' language training is usually aimed at teaching symbols to apes with a subtle expectation that a natural comprehension of their meaning would follow. In this sense, teaching language to apes happens in a much more artificial setting, with the use of a very sterile methodology: apes were required to produce symbols when asked for a particular object or action. When a child points at a bottle of water sitting on the counter, we instinctively give the water to the child, perhaps pronouncing the word "water" or asking if s/he needs to drink. Denying water to an infant because s/he did not construct a correct sentence, or did not pronounce any word at all, for that matter, would be considered child abuse. But most importantly, we know that correct usage of syntax and word acquisition will come naturally and does not need to be forced by the parents. However, this does not seem to happen in the experiments concerning apes' language acquisition. As a matter of fact, humans require greater precision from apes, who, as compared to children, need to construct more complex sentences and set of actions to achieve their goals. One example is that of the chimpanzee Lana, who had to say "Please machine give M&M" through lexigrams when she wanted M&M's from an automatic dispenser (Savage-Rumbaugh, Rumbaugh, McDonald 1985: 653). If she did not press the right sequence of lexigrams, she did not achieve any result. At this point questions regarding the necessity of training arise as well, and they undermine the very stability of such experiments. We need to remember that we are teaching apes something that is essentially extraneous to their species-specific communication system; at the same time, these kind of "forced-trainings" are counterproductive since the ape-user is taken as an object of research,

only evaluated according to how much he responds to the researcher's teachings and not in reference to his actual capacity as a creative subject. We argue that this kind of training disregards the creative mind of the subject-ape.

Since many have argued against the symbolic nature of apes' language use, the next paragraph will deal with the natural communication system of bonobos, with particular reference to their vocalization capacities and gestural communication. This section will serve as a basis upon which the later development of the present work will be constructed, since we will argue that bonobos' natural communication repertoire is naturally characterised by a certain degree of symbolicity.

2.2. Bonobos' Species-specific Communication Systems

Bonobos' vocal repertoire has been one of the major topics of interest for researchers and it is well-documented in many works published in the late 80's and early 90's (de Waal 1988; Bermejo and Omedes 1999). This could be explained by the fact that vocal communication is still considered the *par excellence* form of communication and little interest is still given to non-verbal languages. Studies concerning gestural communication have generally dealt with artificial settings primarily because studying apes' gestures and facial expressions in nature proves to be rather difficult (Pollic, Jeneson, de Waal 2008: 75). This is particularly true in case of bonobos, since they inhabit the area of the Congo Basin in the Democratic Republic of the Congo, an area in constant war which makes it particularly difficult to observe this species in nature. It is however well-known that all four species of great apes – including bonobos – use hands to communicate in different manners (ibid.). We argue that the ability to communicate through hand gestures specific to apes can explain the reason why these animals have acquired sign language or are able to communicate through the use of supplementary materials (such as via a lexigram keyboard in Kanzi's case) with great ability.

2.2.1. Non-verbal Communication in Bonobos

Bonobos employ non-verbal communication systems in different ways. Non-verbal communication is primarily achieved through the use of facial expressions and hand gestures. This particular species of ape engages very frequently in face-to-face situations and eye-contacts with the members of their group, a strategy used to communicate different moods or intentions. What is more interesting is that bonobos display a wide range of ritualized hand gestures, for example they wave at each other to invite the partner to engage in sexual intercourse, shake their wrists as a sign of impatience, beg for food by spreading their arms and presenting their open palms, point at themselves when inviting contact and show dominance by placing their arm on a subordinate member of their group (Pollic et al. 2008: 78-79). These gestures display a certain degree of symbolicity since they happen in a context-free environment as well. One example is that of gesture employed to beg for food. This type of gesture is present also in some species of monkeys, for instance capuchins. What is interesting, however, is that while capuchin monkeys begging gesture is strictly linked to the presence of a food source, bonobos employ this kind of gesture in different contexts, unlinking it from trigger situations and generalizing its meaning in broader contexts. In this sense, the begging gesture is not only linked to food for bonobos, but its meaning has been generalized to other situations as well, for example bonobos use the begging gesture to ask for grooming or support. Its interpretation remains linked to the social situation in which it occurs, meaning that it does not have a fixed meaning.

Bonobos' hand gestures are highly complex and require special attention. Slight variations in similar gestures have different meaning and may result in different responses from the partner engaging in the communicative act. For example, stretching out one's own arm and hand with upward palm is more commonly present when requesting a grooming session; the same gesture with the palm facing the side is used when requesting food; lastly, the palm is instead facing the ground when a bonobo is inviting a conspecific to play. Moreover, bonobos grown in captivity and taken care by humans have been known for engaging in unusual gestural

communication, for example some have been observed clapping (de Waal 1988: 222). Clapping was observed in the first seven generations of bonobos at San Diego zoo that had been raised by humans, but was absent in other members later added to the group who had not been raised by a human caretaker. Generally, this behaviour was observed in moments of concentration or to express enthusiasm (de Waal: 1988: 222). This also supports the idea that bonobos' communication repertoire is highly flexible and malleable, since this example demonstrates how a different gesture than that already present in their own "natural stock" has been appropriated and associated to some particular meanings. The clapping gesture has been adapted by the apes to their own needs and is used in social contexts that exclude the presence of the human caretakers. This implies that its meaning has been generalized to broader social settings and it is no longer linked to the human presence.

2.2.2. Bonobos' Vocal Communication

Bonobos' vocalizations are characterised by their great versatility and high complexity, and include twelve principal call types (de Waal 1988: 200-214), three of which are used during or in proximity of feeding situations. De Waal highlights that "peeps" emitted during feeding events are highly variable, suggesting that they may be interpreted with meaningful differences. Vocal communication in primates has always been an object of focal attention, mainly because scholars have attempted to find answers to human language evolution by looking at our closest relatives. Primates' vocalization is clearly very advanced and shows some degree of symbolic use. It has been argued that vervet monkeys and other primates use these alarm calls in a fixed manner, that is they always appear in similar contexts (for vervet monkeys when the predator is present, for example) and are linked to certain standard responses. This claim, however, has been more recently challenged by studies that show a much greater flexibility than earlier believed: an example is that of great apes kept in captivity who produce voiceless noises, acquired through social skills, for instance to get the attention of their caretakers (Clay, Archbold, Zuberbühler 2015: 2). This would

suggest that apes' vocalizations are not as fixed as those of monkeys. This is even confirmed by those studies conducted with captive bonobos, as we will show later on.

If we look closely at bonobos' vocal repertoire, the majority of related works deals with the so-called peep sound emitted by bonobos in various contexts. The peep sound has been analysed in nature and in captivity and both researches seem to provide very similar results. Although the sound is linked to very diverse situations, it occurs more commonly in proximity of food and during feeding sessions (Clay et al. 2015: 4; White, Waller, Boose, Merrill, Wood 2015: 3). In general, loud vocalizations seem to have a social value rather than agonistic: these kinds of calls function as a mean of social bonding.

Analysis of different voice samples recorded during different times of the day in various contexts show that while positive and neutral peeps emitted by members of a group in general cannot be precisely discriminated, negative peeps stand out very clearly since they are characterized by higher frequencies and shorter duration (Clay et al. 2015: 11). Furthermore, these experiments demonstrate that the caller identity is rightly recognised (Clay et al. 2015: 9) suggesting that they may convey very broad set of meanings. Scholars have claimed that flexible vocalizations were a unique characteristic of humans. However, these experiments show that bonobos produce vocalization in a very flexible manner, adapting them to a wide range of behavioural contexts with different affective valence (ibid. 9). As mentioned, it has been suggested that bonobos neutral and positive vocalizations are for humans virtually undistinguishable (Clay et al. 2015: 12). Nevertheless, bonobos seem to be able to modify, in artificial conditions, the tonality of their peep sound bringing it closer to that of human words variants (Tagliabue, Savage-Rumbaugh, Baker 2003: 1-17). This sort of "imitation" suggests that further research on bonobos neutral and positive peeps is required. If such an attempt is made by the subject under training we would argue that bonobos' peeps in neutral and positive contexts carry distinguishable meaning and are used in different contexts, because such adaptation would consist of an effort to establish meaningful exchange of vocalizations with the partner, in this case the human caretaker. They also suggest that bonobos' vocalizations are not fixed as we were

earlier mentioning, but they are instead rather flexible and allow changes dictated by social situations.

The following paragraphs will introduce the reader to one of the most well-known language competent bonobos, Kanzi. Kanzi has been a subject of research for many decades and his learning capacities and language use exceed that of other subjects previously studied. This is linked to the very different methodology that his caretaker, Sue Savage-Rumbaugh has been using to teach language to apes, which is based on a total immersion approach to human language and early exposure to symbol usage.

2.3. Overcoming Apes' Inability to Produce Speech

We have already discussed about apes' incapability to produce spoken words in the previous paragraphs and we also highlighted the different approaches employed by the various researchers to overcome this inability dictated by physiological differences between humans and great apes. Earliest attempts include the training of great apes to use the American Sign Language (ASL) used to facilitate the communication between apes and humans. This methodological approach has been employed by many researchers, among which Francine Patterson who had extensively worked with it to train a female gorilla named Koko (Patterson and Matevia 2001). Different criticism is directed to such methodologies, in the first place by some other scholars who are currently working with other subject-apes. Sue Savage-Rumbaugh suggests the employment of a different methodology to teach apes to use symbols, a methodology that would not rely on apes' vocal modification or sign gesturing. To compensate apes' inability to produce speech the American primatologist developed a keyboard (see *Annex 1*) containing "non-iconic graphic symbols" (Savage-Rumbaugh et al. 1985: 655); each of these symbols corresponds to spoken word. The symbols on the keyboard employ the so-called Yerkish language, an artificial language developed for non-human primates, and was first used with Lana, a female chimpanzee trained in the early 70's. The use of such keyboard allows the subject-ape to overcome his or her bodily limitations and communicate with his/her caretakers via graphic symbols. As mentioned, the keyboard includes a series of non-iconic symbols. The non-iconicity of these

symbols avoids any possible association of meaning to picture solely based on an iconic level and therefore ensures that the symbol-referent association is completely arbitrary. More recently, the lexigram keyboard has been connected to a computer which records the answers and produces spoken words when pressed; however, when the subject is outside a portable version of the keyboard is used that the bonobo carries with him-/herself.

2.4. Kanzi's Language Acquisition and Linguistic Exposure

Sue Savage-Rumbaugh is best known for having taught graphic symbols to a bonobo she named Kanzi⁴. Kanzi has been exposed to graphic symbols at a very young age: when he was six months old he was brought to the Language Research Centre together with his mother Matata (Savage-Rumbaugh et al. 1985: 654). He was not actively trained in symbol usage but, since at that time Savage-Rumbaugh was attempting to teach symbols to his mother Matata, he had observed for many years his mother's training sessions. During this period, he showed very little interest in the keyboard and training sessions, preferring to play and disturb his mother while she was being trained. When he was two years old he was separated from his mother for four months and he grew attached to his human caretaker. It was during this period that his interest for the lexigram keyboard grew stronger and some fascinating discoveries were made: Kanzi began to use the lexigram keyboard to communicate his intentions and desires and showed that he had learned many of the symbols on the lexigram that they had been struggling to teach his mother (Savage-Rumbaugh et al. 1985: 655). The novelty of Kanzi's case lies in this particularity; he is reportedly the first ape to learn to communicate with humans without active training. Kanzi was able to name food when offered and if a selection of different food was offered he was able to name his favourite choice (ibid.). Following these examples, it was decided that Kanzi's symbols' acquisition would not be encouraged with food or drinks rewards, but symbols were used around him without explicitly expecting that he would learn and use them. In addition, daily activities were planned according to Kanzi's requests

4 'Kanzi' means 'a treasure' in Swahili.

through symbolic communication: Kanzi was encouraged to communicate through the use of symbols where he desired to go and what he wished to do. In this sense, Kanzi's language acquisition and use followed very natural steps and escaped the more artificial settings and methodologies used in previous researches and that were so harshly criticized. Kanzi acquired language like a human child usually does: by observing the "adults" around him and by being encouraged to communicate his wishes through the use of symbolic signs.

The utterer's meaning becomes the functional level of analysis (Savage-Rumbaugh et al. 1985: 656). To enter Kanzi's vocabulary a word used by Kanzi needed to correspond to an action through a behavioural concordance: if Kanzi requested for his ball through his lexigram the listener would ask him to go and find his ball. If Kanzi went to search and bring back his ball a behavioural concordance was recorded. A new symbol entered Kanzi's vocabulary only if it occurred spontaneously on nine out of ten consecutive occasions. Kanzi also showed understanding of human speech and of correct syntactic structures (Savage-Rumbaugh et al. 2009: 31). He showed great ability in understanding novel and unusual sentences and his ability to fulfil tasks as instructed by the researchers exceeded that of a human child named Alia, who had also been examined in a similar way. In order to test Kanzi's understanding of grammar, Sue Savage-Rumbaugh created a series of controlled blind tests consisting of about 660 novel sentences (Savage-Rumbaugh et al. 2009: 30); a human child named Alia, who was 2 years old at the time, was also tested. Alia was the daughter of one of Kanzi's caretakers and she had acquired language and lexigrams in a similar way Kanzi did (*ibid.*). The sentences were constructed so that their understanding was dependent on Kanzi's comprehension of syntactical rules and grammar. For example, Alia and Kanzi were asked to "make the [stuffed animal] doggie bite the [toy] snake", "go get the snake that's outdoor" and "put the ball on the pine needles". Not only did Kanzi understand that "snake" and "doggie" both referred to toys in front of him, he also understood the English diminutive for dog, and most importantly, he fulfilled the action correctly, by closing the dog's mouth on the snake's head, proving that he had understood that by using the word "make" the researcher was not asking him to bite the snake, but to act out a scene between two objects. In

comparison, Alia did not properly understand what was required and proceeded by personally biting the toy snake. On these kinds of novelty sentences Kanzi responded correctly on 66% while Alia only on 38% of the cases (Savage-Rumbaugh et al. 2009: 30). In the second case, a toy snake was in front of Kanzi. If he was simply inferring the meaning of the sentence by recognizing individual words, as claimed by Clive Wynne (2008), he would have taken the toy snake outside. However, Kanzi responded correctly to the request by going outside and looking for another toy snake that had been hidden there. Kanzi's understanding of spoken language is comparable of that of a two years old child (Lieberman 1998: 43).

While previous research did not precisely focus on testing the understanding of syntax and grammar, Sue Savage-Rumbaugh moves forward and has conceived a test that would specifically assess this aspect of language. We argue that apes show broader comprehension of sentences and syntactical structures when exposed daily to language use and human speech. It seems that the total immersion in a linguistic environment also results in better understanding of syntactic relations. Syntax, in this sense, becomes a secondary product of speech understanding, since previous researchers who only attempted to teach proper grammatical structures to apes (Terrace et al. 1979), disregarding other components of human language, have not achieved similar results. Savage-Rumbaugh, moreover, seems to take Kanzi's own needs and will as a prominent part of her research and experiments. In this respect, we can mention her support to Kanzi's and other bonobos' personal interests, with music and games as some examples; her attempt to construct a hyper-stimulating environment to fully develop Kanzi's speech understanding and use of language; finally, her decision to raise Kanzi in a non-exclusively human environment played a major role in the development of Kanzi's social skills and in the growth of a well-rounded individual. These tasks required knowledge and understanding of English syntactic structures to be fulfilled.

It has been argued that apes seem in general more capable of expressing themselves through gestural communication and display a great control over body movements, a control that is lacking in case of vocalizations (Pollic et al. 2008: 84). This would be the reason why experiments focusing on the alteration of apes'

vocalization used as a mean of inter-species communication have failed, while more recent works aiming at teaching sign language to apes show more positive outcomes. However, we do not share this position especially in light of Kanzi's own achievements. It has been shown that Kanzi is able to modify the tonality of his peep sound to bring it closer to that of human words variants (Taglialatela et al. 2003) in a sort of attempt to imitate human speech. This would require a much greater control over their own sound production, with a far better precision than what scholars usually believe apes to possess.

Some may wonder why great apes have not developed in nature such a sophisticated system of communication if they are perfectly capable of acquiring this kind of symbolic communication. We could answer this question with one simple answer: they do not need this kind of development. Great apes have developed efficient system of communications during the course of evolution that have permitted them to overcome the difficulties that they encounter in everyday life, and this applies to other animals as well. It is highly improbable that these animals would, for example, start using a highly complex sign language like humans do, since, as already explained, their dexterity is rather limited if compared to that of humans. At the same time, it would be dubious that bonobos or other species of apes would start building their own lexigram keyboards to communicate with other members of their species. First of all, great apes use of technology is very limited, especially if compared to human technological use; secondly, we are dealing with a highly artificial instrument that has no comparable counterpart in nature, especially in case of bonobos. We need to understand that this communication system that is being taught to great apes remains an *ad hoc* language, used by apes and humans to communicate with each other. If a communication system based on vocalization, gestures and olfactory signals fulfils the requirements of these animals' everyday life, we would argue that there is virtually no need for apes to develop a totally new and extraneous communication system. Only because humans, who we remind belong to another animal species, have taught a group of apes to use a set of highly artificial symbols does not make their own communication system invalid or outdated. In this sense, natural language remains the best instrument for communication only according to humans. We argue that these

claims are nourished by an anthropocentric point of view that sees the natural evolution of communication as a striving towards the development of human language.

The next chapter will deal with the different ideas that researchers have on the concept of language and will highlight how these are responsible for the creation of different methodological approaches to apes' language acquisition. We will also focus on apes' creative use of language and we will underline how this has been a very underrated aspect of the IC experiments.

3. THE CREATIVE POWER OF LANGUAGE

This chapter will investigate how different research paradigms used in the *Interspecific Communication Experiments* (ICE) result in utterly diverse methodological approaches to language teaching, with consequent contrasting outcomes. Here we will therefore discuss the general differences between aims and methodologies of researchers at issue. These were nourished by their contrasting opinions on the nature of language and by their attitude towards language-competent apes. All of this inevitably led to conflicting discoveries and results on the same and more general topic of apes' language experiments.

This section will explore in more detail the creative power of language with the intent of demonstrating how this intrinsic aspect of language has been generally underrated in the *Interspecific Communication Experiments*.

Finally, this chapter will also provide insights on the concept of language as a modelling system and how this affects the usual semiotic reality of apes under study, with particular reference to bonobos. Other examples will be provided to support these arguments and to draw parallels between different researches. We will here also provide some suggestions that future research could take into consideration for the development of a more comprehensive research paradigm.

3.1. On the Nature of Language

The problem with apes' language training can be directed to the different ideas that researchers share on the concept of language. Different definitions of language have been already discussed in the previous chapter: from one side language is essentially equated to grammar and syntax, from the other side more recent works have underlined

that the social component of language constitute the most predominant aspects of human language, thus moving towards a much more pragmatic prospective (Thibault 1997; Cowley 2011).

These two divergent views are responsible for the production of conflicting outcomes, since they virtually lead to the use of different methodologies conceived to reach extremely distinctive results. Variations in the definitions of the essence of human language, opposite ideas concerning the development of this faculty and heterogeneous opinions on its unique traits are responsible for the extremely different approaches used in the apes' language research.

We have already highlighted in the previous chapter how traditional views on language paid more attention to grammatical structures and syntactic rules. These positions are marked by their strong nativist claims. Noam Chomsky proposed the idea that language can only be explained as much as it is regarded as a biological product (1968: 100), embedded in the human brain or in our genes. According to Chomsky, this *universal grammar*⁵ is hard-wired in the human brain, making it possible for humans to develop a fully functional language in a relatively limited time. Chomsky bases this idea on a simple equation: children acquire language in the most natural way without being actively taught and are able to learn any grammatical structures typical of any human language; since for him the vastness of grammar is unlearnable for a child who receives relatively little stimuli, a language predisposition must exist in humans and can be only be found somewhere in the brains or in our genes. Although his theory has never been proved, Chomsky poses several questions on the nature of language what should be of interest for linguistic studies.

⁵ According to Chomsky human languages share some fundamental similarities, even if they appear very different on the surface. Chomsky gives these 'properties' a universal nature, since he believes that that these are attributable to innate principles unique to human language. It essentially includes a system of categorizations, mechanisms and constraints that are common to any human language.

3.1.1. Language Development of Nim Chimpsky and Kanzi

In 1976 Herbert Terrace conducted a series of studies with the intention of teaching language to a chimpanzee he had named Nim Chimpsky (Terrace et al. 1979), a witty reference to Noam Chomsky. These tests were designed to prove that apes could acquire grammatical knowledge if they were exposed to extensive training following what he believed was the best methodological approach: Nim underwent a series of hard trainings and tests while enclosed in a chamber room which was deprived of any possible external influence; the room, for example, was painted in white and had no windows. The sterility of such environment was justified by the desire to avoid any possible distraction so that the chimpanzee could solely focus on his training and on what the researchers were trying to teach him. The training was exclusively focused on grammar and syntax acquisition and Nim was not encouraged to produce novel combinations nor to introduce variations in the newly learned system. Furthermore, Nim was raised as a human child in a completely human environment: contacts with other members of his species were not part of his daily routine.

After initial encouraging results, Terrace concluded that his attempts had failed (Terrace et al. 1979: 891). He noticed that Nim was not able to sign spontaneously but he was only imitating his trainers to get food or objects he desired. Furthermore, he claimed that Nim was unable to use syntactical structures and that he had only acquired fixed amount of words that he used in different occasions only with the intention of getting a reward. The project was later abandoned and Nim was transferred to a different facility⁶.

Sue Savage-Rumbaugh, on the other side, is clearly influenced by sociolinguistic ideas. As a matter of fact, she defines language as a very complex set of behaviours acquired through joint interactions that involve the intertwining of words and actions between two or more individuals (Savage-Rumbaugh et al. 1985: 653). Based on these ideas, her approach to language acquisition has been much more different than that devised by Herbert Terrace.

⁶ A documentary entitled 'Project Nim' (2011) explores the ethical issues arising from this project and reveals details that were not a central part of previous publications.

Initial attempts were oriented towards active training of apes to use lexigrams in order to receive food but also to obtain other objects and to request activities. At that time Kanzi's mother Matata was being trained (Savage-Rumbaugh et al. 1985: 655). When she began her training, Matata was already six years old (Hillix, Rumbaugh 2004: 174). Even though Savage-Rumbaugh never focused on grammar acquisition as much as previous researchers did, her initial approach to language teaching was rather traditional. Her method was essentially based on the same conventional ways used by other researchers when trying to teach human language to the apes they were studying: Matata was put under very formal training sessions and was required to ask for food or places to go with the use of lexigrams. Even after some years of effort, their attempts failed and Matata was able to use only six lexigrams and was not able to name objects (Hillix, Rumbaugh 2004: 174). She also had no ability to name photographs or use them for requesting activities or objects (Savage-Rumbaugh et al. 1985: 657).

As discussed in the previous chapter, Kanzi was present during his mother's training and did not show particular interest in it until he was separated from the mother: this kind of language was contextualized to ape-human interaction and the need for it only arose after Matata was separated from Kanzi. This situation created new opportunities and challenges that were solvable only thanks to the use of lexigrams and linguistic interaction since Kanzi could not rely any more on his mother. Kanzi was able to ask for objects when he desired them by using his lexigram keyboard, moreover he was also able to name objects when explicitly asked (Savage-Rumbaugh et al. 1985: 657). Following the natural development of Kanzi's speech understanding and the use of lexigrams, Savage-Rumbaugh's position becomes much more oriented towards the development of a methodology that would highlight the social nature of human language. Her own approach leans towards the creation of an environment in which apes are completely immersed in language use and speech production. Compared to Herbert Terrace's approach, Sue Savage-Rumbaugh believes that constant stimulation is a necessary prerequisite for apes' speech understanding and for their own linguistic development. The empty white walls of Terrace training room are here substituted with a lively and colourful environment, filled with stimulating objects such as musical instruments, magazines, computers, toys and big windows. Passive exposure to

lexigrams from an early age is seen a fundamental prerequisite for apes' language acquisition, since it arranges for lexigram discrimination and language settling (Savage-Rumbaugh, Fields, Taglialatela 2001: 288). Moreover, Kanzi and other bonobos have not been raised like human children but they have maintained their relations with other bonobos and even chimpanzees, thus ensuring that their social skills would not only be confined to human-ape interactions. This is particularly important, because bonobos are highly social animal and have relatively long adolescence. As a matter of fact, mothers continue to support their offspring and share food with them even during their juvenile periods (Smith 2006: 279). Finally, as described in the previous chapter, Sue Savage-Rumbaugh encourages outdoor activities and communication often happens in the wild, where Kanzi and others can engage in novel activities and witness unusual situations that would normally be precluded from apes if confined in the sterile environment of the research area. We consider Sue Savage-Rumbaugh's approach to be more respectful of the apes' natural tendencies and it certainly is based on a more dialogic approach if compared to that of Terrace Herbert.

3.2. Apes' Creativity

It is here argued that the majority of *Interspecific Communication Experiments* disregard the active role of apes in language acquisition and its following use. We argue that such experiments are solely focused on a passive reproduction of symbols and grammatical features as injected by the researcher, lacking of a broader scope. Symbols created by the ape itself tend to be ignored and their production is even discouraged, meaning that the ape may use the previously taught symbols only to reach his goals without real communication happening. This could explain why apes' language use has been accused of lacking of real symbolicity, because such experiments lack a deeper interest in the independent development carried out by the apes, focusing more in general on what apes can learn from humans and how much their abilities differ in regards to humans' own linguistic capacities. We return here to one of the major claim of the present work: apes have been studied as an object of research and not as subjects capable of choosing and adapting to one's own use

of what had been learned. From this prospective, the learning process appears to be rather sterile being solely based upon the meeting of certain expectations and it is not constructed through mutual agreement of the two parties participating in the communicative process. Hardly ever, for example, researchers have taken in consideration symbols created by the apes as an instrument upon which to construct a mutual agreed language. We would claim that, at the current stage, much of the apes' linguistic trainings consist of one-way methodologies, from the researcher to the ape. Some later changes have been made by Sue Savage-Rumbaugh, who is generally more attentive to apes' own creations and agency. However, the lexigram keyboard used in her experiments poses several problems in this respect: the keyboard can only accommodate a certain quantity of symbols, which deeply limits the possibility of novel creations. Sign language, on the other hand, allows a much broader margin of inventions because it is not limited by material constraints as a lexigram keyboard is. The lexigram keyboard as conceived by Savage-Rumbaugh only allows novel combinations, but it does not envisage newly created symbols, unless specifically added by the researcher.

In their attempt to teach human language to apes, researchers have disregarded apes' uniqueness pretending that they would use and understand words, or symbols, as humans do. There is very little attention given to variation and expressiveness of apes and any autonomous creation by apes is usually ignored or even discouraged, marked as an erroneous understanding of how human language works. Even the most meticulous researchers have constructed a highly artificial language without taking into consideration the apes' anatomical characteristics and the animals' own way of perceiving the surrounding environment.

Researchers have primarily focused on their attempt to teach language to apes without questioning what apes would do with such a tool (Lestel 2014: 50) or by simply underestimating the fact that apes and humans perceive the world very differently and that apes' anatomical differences may be an obstacle for further development of their own linguistic abilities. One example comes from Francine Patterson's methodology. The American primatologist is best known for having trained

a female gorilla named Koko to use American Sign Language (ASL). Since Gorillas have a much more limited dexterity and very small thumbs compared to humans, Koko encountered some difficulties when gesturing signs that require particularly complex hand movements. Instead of agreeing on a sign language that would be suitable for Koko, Patterson's solution consisted in simply teaching a simplified version of the ASL to Koko which only partially bypasses this limitation. Most of the researchers require apes to use language in the exact same way as humans do, including rituals strictly linked to human social interactions (Lestel 2014: 51), an example is that of greeting rituals. These expectations are at best unjustified. Apes' social interaction, gestures, mind-frame and vocalization are therefore ignored in pursuit of teaching apes how humans use language, with the desire of proving that apes are able to use language just in the same way humans do, without any particular interest for apes' own way of employing language nor for the way that such a tool can be used by apes to say something about themselves. This creates several difficulties, because it essentially means that researchers do not take into consideration what the natural abilities and general tendencies of apes are and instead they pursue their attempt to prove the similarities between apes' and humans' language acquisition and usage. No real dialogues can happen in this respect, because communication between apes and researcher will always follow certain patterns. Language will always be mediated (Lestel 2014: 51) because apes will continue to use it only in the way researchers want them to use it. This also creates a situation in which the language acquired by the apes remains confined to the research area, with virtually no expansion or external use.

Instances of apes' creative use of signs are, of course, well-known and documented. For example, Koko combined "scratch" and "comb" to ask for a brush⁷ as she did not know the exact sign for it. She also signed "white tiger" for "zebra", not knowing the sign for "ring" she combined "finger bracelet" and "eye hat" for "mask". Several other instances regard not only Koko, but also other apes involved in IC experiments. In a similar way, Lana, a female chimpanzee, asked for an "orange-coloured apple" because she did not know what lexigram corresponded to "orange" and

⁷ A video of Koko creating the sign can be found here <https://www.youtube.com/watch?v=ds7Xi86EIIQ>.

Washoe signed “drink fruit” for “watermelon” and “water bird” for “swan” (Martinelli 2010: 140); Koko also combined signs to create insults, for example “dirty toilet devil” to one of her human caretakers who had just scolded her earlier that morning (Patterson, Linden 1981: 121). These instances of sign creation, however, usually only occur once because the researcher teaches the ape to use the “correct” sign that replaces the one created by the ape alone. (*ibid.*) Researchers seem to make a big deal of apes’ creativity since it is well-documented in many reports (Hill 1980: 336; Patterson, Linden 1981: 120), however they soon discourage the use of the newly created sign simply because it does not fit in their general methodological framework: in this sense, for the experimenters, form remains predominantly more important than content in the use of signs. By doing that, they are unconsciously taking back language to the much more restricted, but safer, realm of the research area, confining the use of language only to experimental research. Similarly, while chimpanzees find it easier to produce ASL signs that involve touching their own body and much more difficult to produce signs that do not involve body contact (Lestel 2014: 51); this has been completely ignored by researchers, who have instead forced them to use signs that do not involve direct body contact because that is the way humans use sign language; orangutans, instead, tend to produce signs by using their feet too (*ibid.* 52). Orangutans’ feet and hands have very similar functions, since their feet are also used for grasping objects, eating and climbing trees. This means that producing signs by using their feet appears natural for these apes, because the two appendages have very close functions. However, researchers have not recorded signs produced by orangutans with their feet simply because this is not the way humans sign (*ibid.*). By ignoring these instances, researchers have tacitly stated that variations in sign production are not encouraged and that more than constructing an interspecific dialogue they were aiming at proving apes’ ability to use language in the same way humans do. The animal’s own anatomical characteristics, the way he perceives the external world and the manner he interacts with it are once more ignored. In the light of these examples, our opinion is that although some progress has been made since the initial experiments aiming at teaching vocal speech to apes, more recent attempts have still underestimated apes’ own subjective world, anatomical differences and, more in general, the way they interact

with their environment and other subjects. We argue that taking into account apes' own needs, natural communication systems and anatomical features is a necessary step to take in order to engage in an interspecific dialogue. Additional attention should be paid to apes' specific way of using what is taught to them. The kind of variations that orangutans perform, as mentioned above, do not invalidate the experiments' results in any way. On the contrary, these adaptations should be integral part of the language teaching methodologies because they stimulate the active capacities of apes and do not exclusively rely on a passive reproduction of previously learned symbols or on formal aspects of sign production.

In the previous chapter we highlighted the complexity of bonobos' gestural and vocal communication. We highlighted the symbolic qualities of their communication systems and we discussed the non-fixity of bonobos' gestural and vocal communication. However, we notice that Savage-Rumbaugh's methodology does not take into account the vast quantity of bonobos' vocal repertoire nor is it sustained by the rich stock of gestures that are typical of the species-specific communication system of bonobos. In this sense, even the most careful of the researchers seem to make, at least partially, the same mistake. Bonobos' species-specific communication systems are not a central part of the ICE conducted by Savage-Rumbaugh, even though we believe they should be integral part of any proficient method devoted to the construction of an interspecific dialogue. In this sense, we suggest that species-specific communication systems should be a point of departure upon which to build further development in the apes' language experiments.

3.3. Language as a Modelling System

Language has been defined as the *primary modelling system* of our species (Lotman 1991: X) a system that constitutes the essence of our humanity. Practically, modelling systems can be interpreted as "models of the world". This implies that defining language as "a primary modelling system" essentially means that it is mainly

through language that we model our external reality and it is through language that we make sense of the world. Drawing from Lotman's ideas and from Uexküll's concept of *Umwelt*, Thomas Sebeok argued that the primary modelling system was not language, but rather our animal *Innenwelt*, that is our inner subjective world that is responsible for how we interpret external reality (Sebeok, Danesi 2000: 10). From this point of view, language corresponds to our secondary modelling system while culture is seen as the tertiary modelling system (Sebeok 1988: 33). It is therefore clear that language is once again described as a species-specific tool that deeply influences our world representation and, more generally our representation of the world. Non-human animals, on the other hand, only rely on their primary modelling capacities, which are biologically prescribed by the species' *Umwelt*. But what happens to those apes who have been exposed to human language from an early age and that use language in their everyday life? Since apes live in an environment constructed around language and use of symbols, language naturally becomes a fundamental aspect of apes' lives: language shapes the way apes perceive the world around them and, most importantly, it drastically changes the way they interact with other living creatures, both humans or other non-human animals. Humans and apes live together in interspecific communities or "hybrid communities sharing meaning, interests and affects" (Lestel 2002: 52). Very few researchers have questioned how much language changes the semiotic reality of apes (Lestel 2002: 54), but they have rather focused on how similar the use of language by apes was to that of humans (ibid.). As mentioned in the previous chapter, Kanzi's vocalizations are very different from those of bonobos in nature since his voice pitch is much more similar to our normal conversation tone. In this sense, Kanzi does not vocalize like other bonobos do; his vocalizations are highly influenced by his exposure and immersion in a human environment. His vocal production, moreover, exceeds that of other bonobos observed in the wild. Apes who have been exposed to language and that use linguistic communication in their everyday life successfully pass the Theory of Mind tests⁸ (ToM) even though wild apes fail such examinations (Savage-Rumbaugh et

⁸ These tests are often used to assess autistic forms in human and they aim at testing the ability of attributing beliefs, desires and knowledge to others that are different to one's own (Premack Woodruff 1978)

al. 2001: 276-277), suggesting that language has shaped the apes' understanding of the outside reality and the way they approach problem solving situations.

Being exposed to language from an early age and being completely immersed in a linguistic environment allows the apes to engage in activities that would be otherwise precluded to them. As mentioned in the previous chapter, Kanzi usually plans his daily activities through the use of lexigrams (Savage-Rumbaugh et al. 1985: 655), meaning that he explicitly asks for places he desires to go to and activities that he wants to carry out in that particular moment. Besides, Kanzi and his late sister Panbanisha are reported to use stone tools of their own creation to achieve hidden food resources (Roffman, Savage-Rumbaugh, Rubert-Pugh, Ronen and Nevo 2012: 1). First attempts consisted in clapping two rocks together and they were initiated by few demonstrations by the researchers; however, later on Kanzi began to throw stones on a hard surface in order to produce sharp flakes. If no hard ground was present, he simply clashed one rock on the another he had positioned on the floor, and this was his own creative way of producing stone tools that show a great similarity with the ones produced by our human ancestors (Savage-Rumbaugh et al. 2001: 287). Kanzi is able to start a fire and keep it burning; one of his favourite activities is roasting marshmallows on a camp fire⁹. Finally, he loves to cook omelettes and usually asks for ingredients using his lexigram keyboard (Leonard 2014).

We only have to think of the different combinations of signs produced by apes, of which we provided general examples in the previous paragraph. It is clear that language competent apes use language to describe people and situations, but they also use language to talk about events that have occurred to them or to other members of their group. Panbanisha, for example, signed "Austin mad fight" on her lexigram keyboard to indicate that earlier that day a chimpanzee Austin had fought with his mother (Johnson 1995: 64) and the gorilla Michael used a series of sign when asked about her mother that suggest that he had been present when poachers had captured and

⁹ A video of Kanzi lighting a fire and roasting marshmallows can be found here <https://www.youtube.com/watch?v=GQcN7IHSD5Y>

killed her when he was a baby¹⁰, showing rudimentary forms of narration. Moreover, Washoe taught sign language to Louis (Lestel 2002: 54), a younger chimpanzee she had adopted, while Kanzi attempted to teach other bonobos at the Language Research Center at Georgia State University to use lexigrams and he often tried to facilitate the understanding of speech for other bonobos.¹¹

These behaviours are certainly influenced by a long-time cohabitation of apes with humans, however it is here suggested that the use of human language has shaped the way apes think of their surrounding and act into it, as well as it has changed the usual relations with other members of their group and with their human caretakers. In this sense, we argue that language becomes a tool that allows the emergence of certain cultural practices as observed in language competent apes, for instance rudimentary cooking, stone tool crafting and primitive forms of writing. Panbanisha, for example, began to write lexigrams on the floor in her attempt to communicate where she desired to go (Savage-Rumbaugh et al. 2001: 288). In the forest, she often formed lexigrams with wooden sticks or other natural objects if she could not use her lexigram keyboard. This occurred in special occasions, for example when she was confined inside for longer period of time and could not go out due to her health situation, because normally she used her keyboard to communicate with her caretakers. These writing attempts, unfortunately, are not a central part of the general discourse on the ICE and no particular attention has been given to this particular aspect of human language.

3.4. A Link Connecting Apes' and Humans' *Umwelten*

There is still a missing link connecting the *Umwelten* of humans and apes which constitute a true challenge for the researchers involved in the ape language experiments. As a matter of fact, these experiments have mostly focused on singular subjects that, being exposed at early age to human socialization and language, have acquired certain

10 A video of Michael's narration can be found here <https://www.youtube.com/watch?v=DXKsPqQ0Ycc>

11 An example of Kanzi trying to stimulate Tamuli's speech understanding can be found here <https://www.youtube.com/watch?v=iZDLabuNUqI>

human-like traits and are able to use language at a certain level. However, we see this as a short-sighted approach that does not take into consideration, for example, the findings of studies concerning the evolutionary preconditions of human-like social skills in dogs. As already mentioned in the first chapter of this thesis, dogs are extremely talented at reading human communicative behaviour, for example they understand the meaning of the pointing gesture, and are able to tell what a human can see and cannot see in various contexts (Hare, Tomasello 2005: 1), adjusting their behaviour according to the information they get from reading humans' body gestures. This surprising ability is the result of the thousand-years lasting cohabitation and coevolution of dogs and humans. Dogs' social and communicative skills seem to be much more human-like than those of our closest relatives, that is bonobos and chimpanzees. In an experiment in which a food source was hidden and pointed at by humans, it appeared that dogs were able to understand human bodily gestures and social-communicative behaviours at a greater level than primates, since the latter needed to be exposed to several trials before associating such gestures with a meaning. It has also been proven that this ability is not the result of passive learning due to the fact that a dog lives his whole life in a human environment; as a matter of fact, very young puppies and dogs who had been exposed to little human contact were equally able to understand the pointing and gaze cues (Hare, Tomasello 2005: 3) while wolves that grew up in a human environment did not meet the same skills (*ibid.*).

These data suggest that the ape language research experiments lack a cohesive look at the co-evolutionary processes that seem of fundamental importance for mutual understanding of the partners engaged in a communication process. The lack of a long-term vision strongly limits the outcomes of the experiments. Most of the experiments dealt with wild-caught subjects (Matata) or with one generation younger captive-raised subjects, for example Kanzi. Studies concerning human-like social skills in dogs, however, suggest that more generations are needed to show evolutionary social traits. Experiments with domesticated foxes showed similar results than those with domestic dogs. The experiment started in 1959 in Siberia, with the goal of studying genetic modifications dictated by domestication processes (Hare, Tomasello 2005: 3). Animals were selected according to their fearless and non-aggressive approach to humans. By

the 20th generation, these foxes showed typical dog-like behaviours, such as tail wagging and eagerness to get human attention (Trut 1999). These domesticated foxes show a remarkable ability to understand human social cues: their ability matches that of dogs of the same age (Hare, Tomasello 2005: 3). These experiments confirm that a long-term cohabitation with humans stands as a major contribution to the development of that missing link that connects different species' *Umwelten*. This means that a millennial cohabitation with humans brought dogs' social reality closer to ours, creating an overlapping between the two species' *Umwelten*. These traits can be replicated in artificial conditions, at a much higher speed rate, as the experiments with red foxes (*Vulpes vulpes*) have successfully proven. Therefore, our idea is that the creation of long-term experiments, that would take into account studies concerning domestication and human-like social skills in *Canidae*, is absolutely necessary. We imagine the creation of a set of experiments that would take into consideration the need for the development of apes' human-like social skills that would be the result of a long term cohabitation of the two species. It is a difficult task that will require conspicuous time and economic investments. However, we suppose that given the closer proximity of the phylogenetic relationships between humans and apes the experiment will be based upon a more solid basis. This also suggests that apes' human-like social skills should require less time to develop in comparison to foxes. To achieve such results, it would be interesting to develop an interspecific community in which apes and humans coexist and interact in their daily activities. We think that apes should be an integral part of these communities. These communities will be the place in which apes and humans exchange information and meaning on a daily basis, contributing to shape apes' social reality.

This kind of development will ensure that the bridge, connecting the two species' *Umwelten*, will be successfully built. Bringing the two species' *Umwelten* closer together will not only ensure apes' understanding of human social cues, but it will be a mutual enrichment. We believe that humans too will benefit from the cohabitation and co-evolution with apes. This is because, it is undeniable that we know a lot more about dogs' social and semiotic reality thanks to our everyday interactions and own experiences with such species.

CONCLUSION

With our work we demonstrated how different research paradigms behind the apes' language experiments contributed to the creation of different methodologies conceived to teach language to apes, which in return, produce contrasting results, partially based on the different expectations and aims that researcher had in mind. More specifically, these experiments tended to disregard the active role of apes in the experimental area and the creative capacities of apes are commonly ignored in pursuit of formal reproduction of symbols. In our work we discussed the different views of scholars on the nature of language, highlighting both the traditional vision of language which put their focus on the formal attributes of natural language (such as grammar and syntax) and the more recent development of sociolinguistics, in regard of what defines language. Precisely, we referred to the work of Paul J. Thibault and to Stephen J. Cowley's *Distributed language* theory. Sue Savage-Rumbaugh is clearly influenced by sociolinguistics views and rejects the more conservative positions of classical linguistics. Her programmes are built on the idea that early exposure to language use and intensive linguistic stimulation translate into the apes' comprehension of spoken language and become a springboard for the acquisition of symbols.

By analysing the work of Savage-Rumbaugh and other scholars involved in the ape language experiments, we discovered that extensive socialization and complete immersion in a linguistic environment have been decisive factors for the development of practices such as cooking, writing and stone tool making which we here linked to the general development of apes' linguistic capacities; we believe that the modelling capacities of language affect the semiotic reality of apes on many level, changing the way they approach other members of their group and the world around them. Ultimately, the modelling capacities of language are here seen as the principle forces affecting the

semiotic reality of apes, at the same time helping to promote the emergence of certain cultural practices. We support the idea that language use and exposure to a linguistic environment shapes the species-specific communication systems of apes. As discussed, Kanzi's peep tonality is much closer to human speech and he also tends to vocalize more frequently than his wild co-specific members. Cultural practices emerging from language use have not been a central aspect of previous research, whose only focus was on the acquisition of syntactical and grammatical structures as previously discussed. All the other aspects of human socialization have been disregarded, stripping language of much wider features and functions. By exclusively focusing on formal attributes of language, previous researchers have failed to take into account the social dimension of language itself. This would explain why Terrace Herbert's attempts produced very different results compared to those of Sue Savage-Rumbaugh, whose main focus was instead on the social dimension of language. The total immersion technique used by the American primatologist proved to be a valid tool for teaching language to apes. Her method remains, in our view, the most comprehensive and interesting approach to language teaching; moreover, her pragmatic position resulted in the creation of a less artificial setting that stimulated apes' appropriation of language.

In the last section of our thesis we focused on several instances of apes' sign creation that are well-documented throughout the work of authors. We believe that this aspect of the ape language experiments has been greatly ignored, discouraged and harshly criticized. We support the idea that creative use of language should be an integral part of the IC experiments. In our opinion, the creation of new signs must be considered as a symptom of the apes' appropriation of the newly acquired sign system. All ICE reports demonstrate apes' tendency to create new signs to refer to objects, events and people that should be further encouraged in future research.

Finally, we conclude our work by providing a general framework that future research could follow for the development of a more inclusive research paradigm. These ideas are developed following the results of those experiments that proved the role that domestication processes play in the development of human-like social skills in foxes. We suggest the creation of interspecific communities that would support the

experiments on apes' language acquisition and use on a long term basis. These communities will be built upon the idea that long-term cohabitation of apes and humans will lead to the creation of a natural link connecting the *Umwelten* of the two species, a link that at current stage is still missing. We see this connection as a fundamental step towards the development of an interactive dimension in the research paradigm behind the ape language experiments. Such link will ensure that the understanding and acquisition of language by apes will be built upon a more solid basis. We theorized that these co-evolutionary processes will connect the social realities of the two species, facilitating apes' comprehension and language learning, enriching, at the same time, humans' understanding of the social reality of apes.

With our work we suggest the creation of a multimodal sign system, meaning that we hope for future employment of different tools to construct an inter-specific dialogue with apes. At the current stage, ICE have only relied on the use of use of a single tool to overcome the apes' incapability to produce speech, such as sign language and graphic symbols. We believe that the use of a multimodal methodology would be more beneficial to capture the richness of vocal expression and of language itself. For this matter, we suggest that a unique instrument is still not sufficient. We believe that apes should be exposed to several materials which combined would help apes to communicate with their human companions.

Further investigation in the field is required. We suggest, for example, to observe the way that language competent apes interact with wild members of their own species. The creation of situations that could promote intersemiotic translation would represent an interesting point of development for these experiments and could provide further details on the *Umwelt* of apes. However, we understand that this would constitute a true challenge, since situations of this kind require extreme control over the safety of the apes and their human caretakers.

Finally, we hope for the creation of a mutually agreed language that would take into consideration the semiotic reality of apes and that would invest them with an active role in the production and reproduction of symbols.

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Inimahvide keeleeksperimentide uurimisparadigmade semiootiline analüüs

Kokkuvõte

Käesolev magistritöö uurib, kuidas erinevad uurimisparadigmad on viinud liikidevahelistes kommunikatsiooniekperimentides vastakate uurimustulemusteni. Samuti analüüsitakse, kuidas üksteisele vastanduvad ideed on mõjutanud uurijate metodoloogilisi lähenemisi inimahvidele inimkeele õpetamisel. Uurimuse keskmes on eksperimendid bonobodega (*Pan paniscus*), kes on vähemtuntud inimahvi liik ja keda leidub ainult Kongo aladelt. Bonobod, koos šimpansitega (*Pan troglodytes*), on inimese lähimad sugulased. Bonobode juures pööratakse erilist tähelepanu eksperimentidele, mis puudutavad viipekeele omandamist ja kõne mõistmist, kuid samas on autori argumentide toetamiseks toodud näiteid ka teistelt ahviliikidelt. Autor väidab, et ägedad vaidlused ja lahkarvamused nimetatud eksperimentide legitiimsusest on põhjustatud uurijate erinevatest ootustest eksperimentide tulemustele, samuti uurijate erinevatest arusaamadest keele olemusest ja sümbolilisest kommunikatsioonist. See on viinud erinevate metodoloogiate loomiseni, mis kavandatud inimahvidele inimkeele õpetamiseks. Need metodoloogiad põhinevad äärmiselt rangetel kriteeriumitel, mis ei arvesta inimahvide aktiivset rolli loovate subjektidena.

Antud magistritöö koosneb kolmest peatükist. Esimene peatükk pakub teoreetilise raamistiku, millele toetudes arendatakse edasist uurimust. Selles peatükis esitab autor ajaloolise vaate analüüsitava probleemile, kuna see osa loob vajaliku teoreetilise tausta järgnevate peatükkide kontekstualiseerimiseks. Antud eesmärgi saavutamiseks pakutakse semiootilisest vaatepunktist lähtuvalt sümboli definitsioon ning autor toob esile erinevad kuid koos eksisteerivad vaated antud mõistele.

Magistritöö teine peatükk on pühendatud bonobode liigiomase kommunikatsioonisüsteemi analüüsile. Ühtlasi pakutakse ka lühiülevaade liikidevaheliste kommunikatsiooniekspperimentide ajaloost alustades varasematest katsetest 18. sajandil kuni hilisemate, Sue Savage-Rumbaugh, uurimustöödeni. Antud peatükis tutvustab autor isast bonobot Kanzi, keda uuriti Georgia Keelte Uurimiskeskuses. Ühtlasi analüüsitakse, kuidas Kanzi keelt omandas ja seda kasutab. Magistritöö teises peatükis tuuakse esile ka viimase aja arengud sotsiolingvistikast, mis puudutavad keele defineerimist. Täpsemalt viitab autor Paul J. Thibault'i töödele ja Stephen J. Cowley *jagatud keele* teooriale.

Magistritöö viimane peatükk on pühendatud Sue Savage-Rumbaugh (1985, 1995, 2001, 2009) metodoloogia analüüsile, mida kõrvutatakse Herbert Terrace'i (1979) tööga. Need kaks autorit on valitud, kuna nad esindavad vastanduvaid suundi keele õpetamises inimahvidele: Savage-Rumbaugh on orienteeritud sotsiaalsele mõõtmele keele omandamisel; Terrace aga keskendub pigem keele grammatilistele ja süntaktilistele joontele. Antud peatüki keskse osana analüüsitakse keele loomingulist kasutamist inimahvide poolt ning autor toob esile, kuidas keele modelleerimisvõime on aidanud kaasa inimahvide semiootilise reaalsuse loomisel.

Antud tööga pakub autor välja, et inimahvide ulatuslik sotsialiseerimine ja nende pidev kokkupuude keelekeskkonnaga on põhilised faktorid, mis arendavad selliseid kultuurilisi praktikaid nagu toiduvalmistamine, kirjutamine ja kivitööriistade valmistamine. Need praktikad on ühendatud lingvistiliste võimete üldise arenguga. Ühtlasi nähakse keele modelleerimisvõimeid kui põhilisi jõude, mis mõjutavad inimahvide semiootilist reaalsust ning aitavad samal ajal edendada kultuuriliste praktikate esilekerkimist. Autor usub, et nimetatud aspektid ei ole olnud keskseteks varasemates uurimustest, mille fookuses on olnud keele süntaktiliste ja grammatiliste struktuuride omandamine. Autori kokkuvõttev järeldus on, et üldiselt on eiratud inimahvide inimestega sotsialiseerimisel esiletõusvaid nähtusi, võttes keelelt selle laiemad omadused ja funktsioonid. Keskendudes eranditult keele formaalsetele tunnustele, ei ole varasemad uurijad arvestanud keele enda sotsiaalsete mõõtmatega.

Magistritöö kokkuvõtteks pakub autor üldise raamistiku, mida tulevikus läbiviidavad uuringud võiksid järgida, et arendada kaasavamat uurimisparadigmat. Raamistikus esiletoodud ettepanekud on välja töötatud nende uurimuste tulemustest lähtuvalt, mis õnnestunult tõestasid, kuidas rebaste kodustamisprotsessi võib pidada vastutavaks inimesesarnaste sotsiaalsete oskuste arenemise ees. Autor teeb ettepaneku luua liikidevahelisi kogukondi, mis toetaks inimahvide keeleomandamise eksperimente ja inimahvide poolt keele kasutamist ka pikaajaliselt. Nimetatud kogukonnad loodaks toetudes ideele, et inimeste ja inimahvide pikaajaline koos elamine viib loomuliku lüli tekkimiseni, mis ühendab kahe liigi omailmad. Lüli, mis praeguses etapis on ikka veel puudu ja mis autori arvates on põhilisim samm arendamiseks interaktiivset dimensiooni uurimisparadigmas, mis tegeleb inimahvide keeleeksperimentidega.

Annexes

Annex 1



One of the lexigram keyboard used by Kanzi to communicate with his human companions.

Image Credit: The Great Ape Trust Website

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A Semiotic Analysis of the Research Paradigms Behind the Ape Language Experiments

(title of thesis)

supervised by Nelly Mäekivi, MA

Dr. Timo Maran

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